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ABSTRACT

A Piagetian framework is provided for understanding patterns of cognitive growth and their relation to early reading achievement among kindergarten children. Reference is made to relevant research, including recent Piagetian interpretations of prereading, language, and logical thinking. Instructional strategies are offered to guide kindergarten teachers in thinking about the application of Piagetian theory. An example is the language experience method, in which stories dictated by children are the materials of instruction for the first stages in reading. This method is consistent with Piaget's emphasis on experiences preceding reading. From the Piagetian view, children cannot begin to comprehend reading material unless it reflects the knowledge they have constructed through their actions on objects and broad and varied play experiences. Piaget's concept of conservation is also implicated in studies that have shown a relationship between children's performance on conservation tasks and reading readiness. Aspects of reading -- how to recognize upper- and lower-case letters, manuscript and cursive letters, and different letters with the same sounds and the same letters with different sounds -- are believed to require logical thinking processes such as grouping, conserving, ordering, transforming, and perceptual decentering. In view of these considerations, prereading programs have been outlined that include teaching for logical thought. (Author/SS)

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PARADISE VALLEY UNIFIED SCHOOL DISTRICT

CURRICULUM RESEARCH STUDY:

PART 2

A COGNITIVE START IN KINDERGARTEN
THEORY-RESEARCH REVIEW

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A Cognitive Start in Kindergarten

This paper will deal with a conceptual framework for understanding patterns of cognitive growth in young children. It will describe cognitive growth characteristics suggesting how these are linked to competencies called for in early school achievement, especially reading. The focus throughout is based on a Piagetian developmental orientation. Reference will be made to relevant research as well as to several recent position papers offering a Piagetian interpretation of prereading, language, and logical thinking abilities.

There is no attempt to propose a single perspective for viewing the formulation of kindergarten curriculum objectives. However, implications for cognitive development may be integrated with the principles implicit in a number of early childhood models. These would include, for example, a program with a developmental-psychodynamic orientation (Biber & Franklin, 1967); an experiential approach (Montessori, 1964); a human relations training emphasis (Read, 1966); an intervention approach stressing attitudes and aptitudes for school learning (Gray, Klauss, Miller, & Forrester, 1966), or a child-centered approach (Isaacs, 1970).

Kindergarten teachers want what's best for children. They are sensitive to their responsibilities for helping children make the transition from home (or preschool) to public school. They are concerned with promoting readiness in its best sense, either generally in a developmental-type curriculum, or more specifically, in a structured one. The

cognitive factors described here are ones infrequently referred to except in the Piagetian literature. It is hoped that the description may offer kindergarten teachers guides to thinking about the instruction of small groups of children and individual children within ongoing kindergarten programs.

Language Preparation for Reading

Piagetian theory holds that cognitive structures are consistently reinforced by the syntactical structures of language (Inhelder & Piaget, 1964), but that organization of thinking does not arise directly out of language, nor is language the central factor in that development. For example, children may be able to reason when looking at a collection of small candies that "all" the candies would be more to eat than "some" of the candies. But even with the terms available to them, they may be unable to coordinate the two ideas when considering sets and subsets--the relationships among the subordinate groups of birds and ducks and the superordinate group of animals. The relationship of thinking to language and both of these to reading is an important component to consider in the reading process.

Kirkland (1978) using a Piagetian framework applied to beginning reading suggests that children can make use of the same strategies used in acquiring language and thought to become skilled readers. These include a combination of maturation, appropriate experiences and social interactions. Also, before children learn to read they need to know what reading is, a meaningful exchange between writer and reader. They should

also grow to understand that what they experience (and think about) can be said, what they say can be written, and what has been written can be thought about and read by them. Then this rewarding outcome, reading, makes possible more thinking about what one has read and would like to read. Kirkland (1978) concludes by indicating that the language experience method, in which stories dictated by children are the materials of instruction for the first stages in reading would agree well with the Piagetian emphasis on experiences preceding thinking.

It has been noted that many five-year-olds appear to be well advanced in thinking because they possess a fairly sophisticated vocabulary. However, the sensitive observer and listener of children knows well that the words children use or interpret often fit their own pre-logic, not the conventional logic of adults. Teachers encounter this in such instances as the child who went home crying because she had been told to sit there for the present, but never received the present, or the child who was told to bring her address to school the next day, so brought a dress. Child verbalizations, in other words, may mask instead of clarify meanings. Vocabulary is meaningful to the extent that it refers to the context of the child's concrete, first-hand experiences.

Understandings as Precursors to Reading

Children need to acquire cognitive structures organized out of their own actions and interactions before related ideas will have meaning for them (Sonquist & Kamii, 1968). It seems axiomatic at this stage of our understanding about development to say that children cannot begin to

comprehend what they are reading, for example, unless it reflects their existing knowledge constructed through their actions on objects, broad and varied play experiences, self-initiated explorations, learning tasks, and social interchanges with other children and adults. Almost every child can be taught initially to decode symbols or develop word recognition through simple response conditioning. However, a child's zest for interpretation of meaning, coordination of concepts in the reading material and ability to relate the ideas derived from reading to the child's own experiences are dependent, to a great extent, on what the child has previously internalized. Transformation of the abstract printed symbol if learned only through drill, repeated vocabulary exposure, or work book assignments can result in a mechanistic, rote type learning which may prove of limited value in the reading enterprise.

Some Characteristics of Logical Thinking

The comprehensive research of Piaget and his colleagues in Geneva (Inhelder & Piaget, 1969) has traced the evolving ability of children to organize knowledge. As a result, we recognize children's prelogical, intuitive approach is vastly different from adults. We know children's transition to logical thought usually occurs with some backing and filling during the first years of school and is essential for educational progress.

Conservation. Conservation implies an internal system of regulations (thinking) that can compensate for external changes. It permits the child to maintain a characteristic of an attribute (number, amount,

length, etc.) as stable during physical changes of some aspect. Most children entering school don't realize that if juice is poured from one glass to another of a different shape, the amount of juice remains the same; or that one of two identical balls of clay transformed into a pancake retains the same amount of clay regardless of the altered shape. These classic conservation tasks, among many studied by Piaget, are significant not because they reveal what young children still have to learn, but because they reflect how children reason.

Almy, Chittenden, and Miller (1966) in a longitudinal study of conservation in subjects, kindergarten through second grade, demonstrated a relationship between logical thought and reading readiness, comprehension, and school achievement. The authors recommend that for acquisition of knowledge to be something more than meaningless verbalizations, young children need to be exposed to a program with intellectual content that matches their ability to grasp concepts, conservation being one of the key notions. Briggs and Elkind (1973) in a comparison of 16 matched pairs of five-year-old readers and nonreaders, similarly identified conservation level as differentiating between the two. Roberts (1976) summarizes a number of studies showing a relationship between children's performance on selected tasks of conservation and reading readiness, concluding that instruction in reading should match a child's developmental competencies. Nevius (1977) goes further outlining a prereading program which includes teaching for logical thought. These include patterning, comparisons, classification, predictions, and hypothesis forming.

Grouping and reversibility. Other factors related to beginning reading include the forming of grouping structures and mental processes which are reversible. Precursors to these attainments are being developed at four- and five-years of age, with roots laid down even earlier. For example, the kindergarten child begins classification through spontaneously grouping like pairs from an array of objects. In this way he becomes familiar with the notion that 2 buttons + 2 buttons = 4 buttons. After many such combinativity experiences with varied groups of objects, he may himself construct the notion without being told that

if he begins with 4 buttons and removes 2, he will have 2 left, 4 - 2 = 2. He can then generalize this to other objects. He will also become able to move back and forth with the objects (and in his mind) between the additive and subtraction notion. At a younger age he would have been able to attend only to one idea. That is, he would have fixed or centered on the combination idea, not on its reverse potentialities. He would have lacked the ability to perform an action in the opposite direction, to have followed an operation from its conclusion back to its beginning and vice versa.

Classification and seriation. Other logical thinking abilities have their origins in the first five or six years of life and are consolidated in the first years of elementary school. These include a child's understanding of functions in a variety of concrete relationships: forming and reforming groups by employing his own spontaneous criteria for such a task based on color, form, size, weight, texture, function, and the like; becoming able to shift criteria and adhere to it in forming a new grouping system; grasping the notion of equivalence and

inequivalence (and being able to coordinate the two) of number, mass, length, and amount; constructing the concepts of more, less, bigger, smaller, longer, shorter; dealing with sets and subsets or wholes and parts and understanding the meaning of all and some; ordering objects sequentially according to varied criteria (longest to shortest, highest to lowest, thickest to thinnest, etc.) and becoming able to judge the intermediate members of a series by comparing each with the one that precedes and the one that follows.

Perceptual Activities and Reading

Perceptual decentering. A series of investigations by Elkind has involved studying the relationship of perceptual activity to beginning reading. For Piaget, on whom Elkind has relied for providing the theoretical base of his work, perception has a different connotation from the traditional view. Looking at an open book and perceiving the pages is clearly a perception, but one's knowledge of the properties of a book far outweighs in meaning and importance the simple, perceptual recognition of pages (i.e., books are the source of information, excitement, plot, pictures, ideas, and the like).

Elkind (1962) suggests that perception is comprised of internal mental actions (thinking), a developing system which becomes increasingly adaptive with age. Evident in this development is the child's movement from a static response that is passive and dominated by the child's centering on only one effect in an array of objects to a decentering wherein a new, higher order perceptual system permits him to restructure

what he is seeing into many possible organizations. These organizations include increased ability with age to perceive figure-ground relationships, increase in success in perceiving ambiguous pictures, and increase in the tendency to explore an unstructured array systematically and with greater complexity (1962, 1967). Advantages of perceptual training on improvement of word and word form recognition in a group of second graders (1969) was also demonstrated.

Perceptual requirements in reading. Beginning reading, according to Elkind (1974) requires the young child not only to recognize or name an alphabet letter (or unit), but also to understand the position of the letter in the total alphabet. In addition, he must then be able to acquire familiarity with the phonemic, contextual properties wherein the sound of the letter is determined by its position within a word and its combination with other letters. For example, the child becomes familiar with the phonemic equivalent of a in mat, mate and mark, becomes able to decipher the long a sound in great, grate, and eight. In other words, a child must come to terms with two related phenomena: (a) more than one sound is represented by one letter and different letters can represent the same sound (letters s and c in snake and circus; and (b) upper- and lower-case letters and manuscript and cursive letters are equivalent. These phenomena are not easy, recognition problems, but require thinking capable of conserving, grouping, ordering, transforming, and perceptual decentering--all basic to logical thinking. Where reversal of figure and ground are required, the child needs more than passive perception skills, he needs to be able to reorganize actively, to think about the shifts involved.

In later work Elkind (1973) appears to have moved from a focus on the regulatory processes involved in perception and the increasing of decenteredness to the more inclusive factor of logical thinking, especially conservation, as critical to reading.

Conclusion

Hooper (1968) in discussing the educational impact of the cognitive developmental theory comments that "the great power of Piaget's model likes in its inherent generality and potential application to a broad range of achievement areas subordinate to logical thought processes or reasoning" (p. 425). Many topical areas such as number, space, time, and causality are directly inferable for teaching or inclusion in the curriculum. In addition, the essence of the structural components and logical operations are general factors which integrate a wide range of superficially distinct type learnings.

In short, the teacher's task is to achieve a guided match between the child's level of cognitive organization and the level of difficulty of the concepts she is working to help him acquire. This suggests further active engagement of the child if the learning process is to be effective.

It may be regrettable that no Piagetian prereading or reading model exists for teachers to follow. There does exist an enormous amount of literature on learning and development contributed by Piaget. A few studies with relevance for reading were summarized in the preceding pages.

There are principles to be derived from Piaget's comprehensive theory of development. Learning to read embraces many practices already familiar to teachers, and, in fact, are reflected in numerous on-going kindergarten programs, not necessarily conceptualized as Piagetian.

Since first encounters with Piaget's work tend to be associated with what has been termed a myth of incomprehensibility, it is rewarding to discover the presence of many interpreters of his ideas. Less numerous, are individuals interested in application. One author who writes both as an interpreter and a practitioner is Barry Wadsworth (1978). For the teacher who may question what all this means for a cognitive start in kindergarten, a clarifying discussion by Wadsworth is abstracted below.

Wadsworth considers certain cognitive capabilities as prerequisites for acquisition of reading skills. For example, ability to comprehend and organize the confusing fact that many letters have a variety of pronunciations and a given sound can be written with a number of different letter patterns depends on a certain capabilities of a child for logical thought. He points out that these logical capabilities are developmental in nature, and cannot be taught directly to the child.

Wadsworth proposes that a beginning reading program consistent with Piagetian principles of development would be structured (1) <u>to permit the child to break the reading code</u>--encourage his actively trying to figure out what letters and words are all about, organize the world of written symbols as he organized the world of spoken symbols; (2) <u>to permit the child to deal only with words that are meaningful to him</u>--promote the child's having a concept of the object written and thus a

meaning to attach to it, even if it is not yet a fully evolved concept from an adult perspective; (3) to permit the child to engage spontaneously the problem of reading--allow him to begin to predict word meanings when there is some reason for him to do so; and (4) to be individualized in every sense of the word--support the phenomenon that each child constructs the reading process at his own rate. Group reading activities wherein there is freedom to interact, to ask one another questions, read to one another, exchange information, listen to stories, etc. are appropriate, also, however, any instruction should be completely individualized to account for individual differences.

Wadsworth concludes his suggestions with a description of Sylvia Ashton-Warner's approach to reading as one possibility that is consistent with Piagetian principles. He provides a succinct description. He discusses other approaches such as a variety of language experiences wherein there is talking, writing, and reading related to activities, extensive use of signs and other written words found in the classroom, school, and neighborhood, and use of concrete situations wherein learning to read has real adaptive value.

In conclusion, it is clear that thinking is a component of development which permeates all that a child does in kindergarten, whatever the philosophical orientation. Thus, the role of the teacher who is aware of the importance of thinking development in children is one who is a planner or arranger of learning situations. These experiences correspond to children's natural activities. The teacher becomes an observer, listener, and sensitive questioner--all in all, a facilitator of reasoning in a child.

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Appendix

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Guides for the development of an instructional program in beginning reading in first grade.

1. A child must have certain preliminary skills before reading instruction is begun. There are two basic components to the preparation:
   (a) Understanding that reading is a means of communication, and that the written representation is a code for language.
   (b) Adequate discrimination skills, both visual and auditory.

2. The reader who is competent has three kinds of information available to him as he reads: (a) Phonological (spelling-to-sound correspondence) and orthographic (spelling patterns) constraints; (b) Syntactic constraints (grammatical structure); (c) semantic constraints (meaningfulness).

   Spoken English becomes a basis for grammar and meaningfulness. However, spelling-to-sound correspondence has no roots in language or other content previously available to the child.

3. The beginning reader should be given simultaneous training in using all three types of information. This follows from the notion that when teaching a complex task it is preferable to start training on the task itself, or a close approximation, rather than giving training on each component skill independently and then integrating them.

4. The child must learn to approach the reading task with the understanding that there is variability, that is, he should acquire "a set for diversity." Thus, if more than one phoneme is represented by a single grapheme, the child should be introduced to both correspondences very early in training.

5. The child should encounter sentences from the very beginning of training, because the sentence is the minimal unit which (1) insures comprehension and (2) provides all three types of information.

6. The relationship between reading and language must be made clear form the beginning, through natural intonation, emphasis on reading as a means of communication, etc.

7. The classroom should constitute a "literate environment." Exposure to language and reading-related activities should not be restricted to periods of formal instruction. The beginning reader should also be shown what skillful reading is like, through frequent exposure to adult reading of material interesting to the child.

   The curriculum should reflect the assumption that children come to reading instruction with rich language abilities which instruction should capitalize on. Moreover, beginning reading skill can be acquired not only through direct, formal instruction, but also through informal contact with various activities and materials in the classroom.

   The use of story charts, class newspapers, displays, discussions, and other means of emphasizing communication should accompany direct instruction to advance the development of language and reading skills.

   (pp. 323-325)

Curriculum Research Study: Kindergartens
Paradise Valley School District
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Demonstration: Piagetian Tasks

Guide to Tasks

These eight tasks are designed to reveal, in part, not what children still have to learn, but to reflect how children reason, how they organize relationships in their thinking. The task responses are influenced by children's maturation, previous experiences, social interactions, and by what Piaget refers to as a regulatory factor that unifies the other three influences, keeps them in balance.

(In Brief:--)

Comprehension of the idea of common qualities -- what belongs together; ability to center on one idea at a time; ability to shift from one concept to a different one.

1. Classification. Many, if not most kindergarten children, if directed verbally, would be able to group blocks together "of the same color," "of the same size," and "of the same shape." This task in the battery, however, requires a child to think "independently," to identify a criterion he has available to him and then to center on that one criterion without forgetting it while he performs the grouping. He then must be able to let go of that idea, and identify a second criterion, and subsequently, a third one. This task then taps a child's understanding of the groupings; a child's ability to construct a group while keeping in mind the criterion from which he is working; and the child's ability to be sufficiently flexible mentally to shift from one criterion to a different one.

   To Pass, the child must be able to group successfully according to two criteria (and to have furnished these criteria himself).

Understanding of the stability of an objective attribute regardless of apparent changes.

2. Conservation of Mass. Child needs to understand that amount (mass) remains the same in spite of physical changes of some aspects,"an internal system of regulations that can compensate internally for external changes.

   To Pass, the child must conserve amount on both tasks (hot dog and sausage transformations) and give at least one of three possible explanations (a) nothing added, nothing taken away; (b) change in one dimension (longer) is compensated for by change in another dimension (thinner), hot dog; and (c) mass can be restored to the original size (inversion or reversibility).

3. Seriation. Child needs to be able to order rods from longest to shortest, succesively, requiring him to compare each rod with one longer and one shorter, and, in this instance, to insert two additional rods in the proper places.

To Pass, the child must have sequential alignment and insertions correct.

Use of a systematic method consisting of first looking for the longest or shortest element, then looking for the next one, etc., a method called "operatory" by Piaget..showing that a child understands that a given stick B is simultaneously bigger than the previous one A and smaller than the next one, B.

4. Conservation of Volume. Child needs to understand that volume remains the same in the task in spite of physical changes in size of containers used.

To Pass, the child must correctly answer the three transformations (from identical containers into a tall, thin one; and from identical containers into four small containers, and give one of the three possible reasons as in 2 a, b, & c.

Understanding of the stability of an objective attribute regardless of apparent changes.

5. Right-Left Orientation. Child needs to be able to place himself spatially in the position of the individual opposite to him, identifying that individual's right and left hands when crossed and recrossed.

Conscious awareness or mental discrimination between different viewpoints

6. Classification: Class Inclusion. Child needs to understand whole-part relationships, or supraordinate and subordinate classes, or sets and subsets. Operationally grasps the notion of "all," and "some."

To Pass, a child must give correct answer to all three of the questions in the task.

Regulatory control in thinking of the terms, "one," "some," & "all,"..mobility in thinking permitting movement between and among total classes & sub-classes.